

REMARKS

The Final Office Action mailed on January 16, 2003, has been received and reviewed.

Claims 1, 3-11, 13-44, 46, 48-64, 66-74, and 105-107 are currently pending in the above-referenced application. Each of claims 1, 3-11, 13-44, 46, 48-64, 66-74, and 105-107 has been rejected.

The explanation set forth below is merely intended to supplement the reasons for allowability of the claims of the above-referenced application that have been previously submitted, not to replace the previously submitted reasons.

Reconsideration of the above-referenced application is respectfully requested.

Rejections Under 35 U.S.C. § 103(a)

Claims 1, 3-11, 13-44, 46, 48-64, and 66-74 stand rejected under 35 U.S.C. § 103(a).

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Isaka in View of Overton

Claims 1, 3-5, 7, 9-11, 13, 16, 18-20, 25, 29-32, 34, 38, 39, 43, 46, 48-53, 56, 64, 69-71, and 73 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,482,598 to Isaka et al. (hereinafter "Isaka") in view of U.S. Patent 5,611,846 to Overton et al. (hereinafter "Overton").

Isaka teaches a chromatographic separation device that includes a silicon substrate and a single porous microchannel formed therein.

Overton teaches a miniaturized gas chromatograph of conventional configuration. The miniature gas chromatograph of Overton includes an arrangement of tubular columns that are interconnected with one another by way of valves. The valves determine which of the tubular columns through which a sample will flow. Overton lacks any teaching or suggestion that the miniaturized gas chromatograph thereof could be used for any type of separation other than conventional gas chromatography techniques.

Independent claim 1 is drawn to a sample separation apparatus that includes, among other things, a substrate with matrices formed therein. The matrices comprise at least two discrete, unconnected porous regions.

Independent claim 30 is likewise directed to a sample separation apparatus that includes, among other things, at least two distinct, unconnected columns. In independent claim 30, the columns are capillary columns, each of which includes a porous matrix.

The miniature chromatograph of independent claim 51 includes a substrate with porous matrices which comprise at least two distinct, unconnected capillary columns.

Independent claim 64 recites an analyte detection apparatus that comprises a silicon substrate with matrices formed therein. The matrices comprise at least two distinct, unconnected porous columns. Each of the porous columns of independent claim 64 is continuous with a surface of the silicon substrate.

It is respectfully submitted that there are several reasons that a *prima facie* case of obviousness under 35 U.S.C. § 103(a) has not been established against any of claims 1, 3-5, 7, 9-11, 13, 16, 18-20, 25, 29-32, 34, 38, 39, 43, 46, 48-53, 56, 64, 69-71, or 73.

Notably, the teachings of all of the references that are relied upon in rejecting a claim must be considered as a whole, including portions thereof “that would lead away from the claimed invention.” *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984).

Overton Teaches Away from Both the Asserted Combination and the Claimed Invention

First, it is respectfully submitted that Overton teaches away from both the asserted combination thereof with Isaka and from the subject matter recited in claims 1, 3-5, 7, 9-11, 13, 16, 18-20, 25, 29-32, 34, 38, 39, 43, 46, 48-53, 56, 64, 69-71, and 73.

The teachings of Overton are limited to a conventional tubular gas chromatography apparatus that includes a plurality of tubular columns, each of which is at least indirectly interconnected with (and, thus, not unconnected from) every other tubular column of the plurality. Such interconnection facilitates the selection of a column through which a sample is to be conveyed. FIG. 2(b); col. 9, line 43, to col. 10, line 18. → to facilitate provision of individual sampling

This teaching of Overton is contrary to the subject matter taught in Isaka because the chromatographic separation apparatus of Isaka includes only a single tubular column and, thus, requires no interconnection valves. conveyer system.

Additionally, Overton teaches away from the subject matter recited in independent claims 1, 30, 51, and 64 of the above-referenced application since each of these claims recites at least two porous regions (claim 1), capillary columns (claims 30 and 51), or porous columns (claim 64) that are *unconnected*. thus "multiple columns" to choose an indiv. column upon which control or sample is to be conveyed.

Therefore, Overton teaches away from the asserted combination thereof with Isaka, as well as from the subject matter recited in independent claims 1, 30, 51, and 64 and each claim that depends therefrom.

Isaka and Overton Are Nonanalogous Art

Second, it is respectfully submitted that, although Isaka and Overton are drawn to miniaturized apparatus that are configured to separate one or more constituents from the remainder of a sample, Isaka and Overton pertain to completely different fields of art.

More specifically, the teachings of Isaka are drawn to extremely small, or "micro," separation apparatus that are *formed in* silicon or other *semiconductor substrates*, whereas the teachings of Overton are directed to separation apparatus that employ miniaturized, yet conventional, tubular columns. ① prot. miniaturize, separation column

② pieced

③ combined for multiplicity of columns fabrication

Thus, it is readily apparent that different methodology applies to the structure, fabrication, and use of the devices taught in Isaka and Overton and, thus, that the teachings of these references pertain to somewhat diverse fields of art.

There Would Have Been No Motivation to Combine the Teachings of Isaka and Overton

Third, it is respectfully submitted that there would have been no motivation for one of ordinary skill in the art to combine the teachings of Isaka and Overton in the manner that has been asserted.

As has been noted, Overton teaches away from the asserted combination. Moreover, the teachings of Isaka and Overton apply to different types of sample separation devices and, thus, to different fields of art.

* sample not specified → both are for sampling.
separation of components;
i.e. = sample analyte

Further, while it has been asserted that, by teaching an apparatus with multiple tubular columns, Overton suggests “that fabrication and use of multiple columns in separation chromatographs is well within ordinary skill,” (Final Office Action, pages 5 & 6), there is nothing in Overton that would have motivated one of ordinary skill in the art to develop a separation apparatus (independent claims 1 and 30), chromatography column (independent claim 51), or analyte detection apparatus (independent claim 64) that includes at least two porous regions (independent claim 1), capillary columns (independent claims 30 and 51), or porous columns (independent claim 64) that are *unconnected*. This is because each tubular column of the miniaturized chromatography device of Overton is at least indirectly connected to every other tubular column thereof.

Therefore, it is respectfully submitted that none of Isaka, Overton, and the knowledge that was generally available in the art before the filing date of the above-referenced application would have motivated one of ordinary skill in the art to combine the teachings of Isaka and Overton in the manner that has been asserted.

There Is No Reasonable Expectation of Success

Fourth, it is respectfully submitted that even if one of ordinary skill in the art would have considered combining the teachings of Isaka and Overton, one of ordinary skill in the art would

have no reason to expect that a combination of the teachings thereof, as has been asserted, would have been successful.

If the asserted combination of Isaka and Overton were, in fact, made, the resulting apparatus would include a single porous column which is formed in a silicon substrate and an assembly of miniaturized conventional tubular columns and valves.

As neither Isaka nor Overton enables or even such a combination, and since the Office has not provided any support for its assertion that such a combination would be successful, it is respectfully concluded that one of ordinary skill in the art would have no reason to believe that such a combination would or could be successful.

Isaka and Overton Do Not Teach or Suggest Each and Every Claim Element

Fifth, it is respectfully submitted that neither Isaka nor Overton, taken either separately or together, teaches or suggests each and every element of any of claims 1, 3-5, 7, 9-11, 13, 16, 18-20, 25, 29-32, 34, 38, 39, 43, 46, 48-53, 56, 64, 69-71, and 73.

In particular, neither Isaka nor Overton teaches or suggests a separation apparatus (independent claims 1 and 30), chromatograph (independent claim 51), or analyte detection apparatus (independent claim 64) that includes at least two unconnected porous regions, as recited in independent claim 1, at least two unconnected capillary columns, as recited in independent claims 30 and 51, or at least two unconnected porous columns, as recited in independent claim 64. Rather, the teachings of Isaka are limited to a device with a single column, while all of the multiple columns of the miniaturized chromatography device of Overton are at least indirectly connected to each other.

Therefore, Isaka and Overton, taken either separately or in combination, do not teach or suggest each and every element of any of independent claims 1, 30, 51, and 64.

In view of the foregoing, it is apparent that there are several reasons that a *prima facie* case of obviousness cannot be established against any of independent claims 1, 30, 51, and 64 based merely upon the teachings of Isaka and Overton.

Moreover, each of claims 3-5, 7, 9-11, 13, 16, 18-20, 25, and 29 is allowable, among other reasons, as depending either directly or indirectly from claim 1, which is allowable.

Claims 31, 32, 34, 38, 39, 43, 46, and 48-50 are each allowable, among other reasons, as depending either directly or indirectly from claim 30, which is allowable.

Claims 52, 53, and 56 are each allowable, among other reasons, as depending either directly or indirectly from claim 51, which is allowable.

Each of claims 69-71 and 73 is allowable, among other reasons, as depending either directly or indirectly from claim 64, which is allowable.

Isaka in View of Overton and Swedberg

Claims 8, 26-28, 35-37, and 66-68 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Isaka, in view of Overton and, further, in view of U.S. Patent 5,571,410 to Swedberg et al. (hereinafter "Swedberg").

Claims 8 and 26-28 are each allowable, among other reasons, as depending either directly or indirectly from claim 1, which is allowable.

Claims 35-37 are each allowable, among other reasons, as depending either directly or indirectly from claim 30, which is allowable.

Claims 66-68 are each allowable, among other reasons, as depending either directly or indirectly from claim 64, which is allowable.

Isaka in View of Overton and Miura

Claims 14, 15, 17, 21, 40, 41, 44, 54, and 55 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Isaka, in view of Overton and, further, in view of U.S. Patent 5,132,012 to Miura et al. (hereinafter "Miura").

Each of claims 14, 15, 17, and 21 is allowable, among other reasons, as depending either directly or indirectly from claim 1, which is allowable.

Claims 40 and 41 are both allowable, among other reasons, as depending from claim 30, which is allowable.

Both claim 54 and claim 55 are allowable, among other reasons, as depending indirectly from claim 51, which is allowable.

Isaka in View of Overton and Northrup

Claims 22-24 and 42 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Isaka, in view of Overton and, further, in view of U.S. Patent 5,882,496 to Northrup et al. (hereinafter "Northrup").

Claims 22-24 are each allowable, among other reasons, as depending indirectly from claim 1, which is allowable.

Claim 42 is allowable, among other reasons, as depending from claim 30, which is allowable.

Isaka in View of Overton, Northrup, and Sunzeri

Claims 6, 57-62, and 72 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Isaka, in view of Overton and, further, in view of Northrup and U.S. Patent 5,536,382 to Sunzeri (hereinafter "Sunzeri").

It is respectfully submitted that a *prima facie* case of obviousness has not been established against the subject matter recited in independent claim 57 for at least two reasons.

First, it is respectfully submitted that Overton teaches away from both the asserted combination thereof with Isaka, Northrup, and Sunzeri, as well as from the subject matter recited in claims 6, 57-62, and 72.

Overton teaches away from the subject matter taught in Isaka because the chromatographic separation apparatus of Isaka includes only a single tubular column and, thus, requires no interconnection valves. The interconnection of tubular columns in the device of Overton also teaches away from the separate, unconnected columns shown in and described with reference to FIGs. 7B and 8 of Northrup. Likewise, as each of the tubular columns of the Overton device is at least indirectly interconnected with every other tubular column thereof, none of these columns could be used as a control column of the type taught in Sunzeri. For these

reasons, it is evident that Overton teaches away from the asserted combination of the teachings thereof with those of each of Isaka, Northrop, and Sunzeri.

Additionally, Overton teaches away from the subject matter recited in independent claims 1, from which claim 6 depends, and claim 64, from which claims 72 depends. Furthermore, by teaching that all of the tubular columns of the device thereof are at least indirectly interconnected with one another, Overton teaches away from an electrophoretic apparatus that includes both a sample column and a control column.

Second, it is respectfully submitted that, although Isaka, Overton, Northrop, and Sunzeri are drawn to miniaturized apparatus that are configured to separate one or more constituents from the remainder of a sample, Isaka and Northrop pertain to a field of art that is completely different than that to which the teachings of Overton and Sunzeri pertain.

More specifically, the teachings of Isaka and Northrop are drawn to extremely small, or “micro,” separation apparatus that are *formed in silicon or other semiconductor substrates*, whereas the teachings of Overton and Sunzeri are directed to separation apparatus that employ miniaturized, yet *conventional, tubular columns*.

Thus, it is readily apparent that, in general, the structures, fabrication, and use of the devices taught in Isaka and Northrop differ from the structures, fabrication, and use of the devices taught in Overton and Sunzeri and, thus, that the teachings of these references pertain to somewhat diverse fields of art.

Moreover, claim 6 is allowable, among other reasons, as depending indirectly from claim 1, which is allowable.

Also, claim 72 is allowable, among other reasons, as depending from claim 64, which is allowable.

For these reasons, it is respectfully submitted that a *prima facie* case of obviousness has not been established against any of claims 6, 57-62, or 72.

Isaka in View of Overton, Northrup, and Crenshaw

Claims 33, 63 and 74 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Isaka, in view of Overton and, further, in view of Northrup and U.S. Patent 5,726,085 to Crenshaw et al. (hereinafter "Crenshaw").

Claim 33 is allowable, among other reasons, as depending from claim 30, which is allowable.

Claim 63 is allowable, among other reasons, as depending from claim 57, which is allowable.

Claim 74 is allowable, among other reasons, as depending from claim 64, which is allowable.

Each of these claims is additionally allowable since Crenshaw, which teaches a memory capacitor of a dynamic random access memory (DRAM) cell, is from a field of art that is so unrelated to those to which the teachings of Isaka, Northrop, and Overton apply that there is no way that one of ordinary skill in the art could have been motivated to combine its teachings with those of any of Isaka, Overton, or Northrop.

In view of the foregoing, it is respectfully requested that the 35 U.S.C. § 103(a) rejections of claims 1, 3-11, 13-44, 46, 48-64, and 66-74 be withdrawn.

Rejections Under 35 U.S.C. § 102(e)

Claims 105-107 stand rejected under 35 U.S.C. § 102(e).

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single reference which qualifies as prior art under 35 U.S.C. § 102. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Furthermore, the identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). Additionally, the elements must be arranged as required by the claim, but identity of the terminology is not required. *In re Bond*, 15 USPQ2d 1566 (Fed. Cir. 1990).

Thakur '159

Claim 105 stands rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent 6,255,159 to Thakur (hereinafter "Thakur '159").

Claim 105 recites an ultrasmall flow channel device. The ultrasmall flow channel device of claim 105 includes a flow inlet and a flow channel. The flow channel is connected to the inlet and comprises a matrix formed of hemispherical grained silicon.

Thakur '159, by way of contrast, is drawn to a capacitor for a cell of a memory-type semiconductor device. It is readily apparent those of ordinary skill in the arts of memory-type semiconductor devices and sample separation apparatus formed in semiconductor substrates that a capacitor is not a "flow channel device," does not include a "flow inlet," and does not include a "flow channel." In fact, Thakur '159 lacks any express or inherent description that flow may occur any feature of the DRAM capacitor described therein.

It is, therefore, submitted that, under 35 U.S.C. § 102(e), independent claim 105 is allowable over Thakur '159.

Thakur '847

Claims 105-107 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent 6,126,847 to Thakur et al. (hereinafter "Thakur '847").

Like Thakur '159, the description of Thakur '847 is limited to capacitors of the memory cells of memory-type semiconductor devices.

As such a capacitor is not an "ultrasmall flow channel device," does not include a "flow inlet," and lacks a "flow channel," as are recited in independent claim 105, it is respectfully submitted that Thakur '847 does not anticipate each and every element of independent claim 105. It is, therefore, respectfully submitted that, under 35 U.S.C. § 102(e), independent claim 105 is allowable over Thakur '847.

Claims 106 and 107 are both allowable, among other reasons, as respectively depending directly and indirectly from claim 105, which is allowable.

Claim 106 is further allowable since the capacitor dielectric described in Thakur '847 is not a stationary phase.

For these reasons, it is requested that the 35 U.S.C. § 102(e) rejections of claim 105-107 be withdrawn

CONCLUSION

It is respectfully submitted that each of claims 1, 3-11, 13-44, 46, 48-64, 66-74, and 105-107 is allowable. An early notice of the allowability of these claims, as well as an indication that the above-referenced application has been passed for issuance, is respectfully submitted. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully submitted,



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Date: March 13, 2003

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